

Amendment E
U.S. appl. no. 10/579,954

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REMARKS

Claims 40-59 are pending in this application.¹

Amendments

Claim 40 has been amended so as to remove a limitation made superfluous by the expansive reading given in the 5/27 Action to the term *organic solvent* and the teaching of U.S. Patent No. 6,258,891 (hereinafter "US'891").

Claim 59 has been added. Support for this claim can be found at, for example, the first full paragraph of page 6 of the specification, taking into account the generally accepted meaning of the term *solution polymerization*.

Rejections

The 5/27 Action rejected each of the previously pending claims under 35 U.S.C. § 103(a) as being obvious, specifically,

- **claims 40-45, 47, 49² and 54 – US'891 in view of U.S. Patent No. 6,294,624 (hereinafter "US'624"), and**
- **claims 40-58 – US'891 in view of U.S. Patent No. 5,811,479 (hereinafter "US'479").**

These rejections are respectfully traversed.

In discussing US'891,³ the 5/27 Action noted the following (at page 2):

4. As to claim 40, Hoxmeier teaches a method of making a polymer where a living polymer, made from comonomers which include styrene (col. 2, ln. 40-41), which is an unsaturated monomer, is reacted with a cyclic siloxane and to form a living block copolymer which can be functionalized with an amino group (abstract; column 1; lines 29-67; column 2, lines 4-41;

Applicants respectfully submit that this evidences a misinterpretation or misunderstanding of the language used in claim 40.

Claim 40 involves reaction between a living polymer that comprises unsaturated mer with a particular type of cyclic compound. The terms "mer" and "monomer" are not synonymous: *a mer is that which results after a monomer is incorporated into a polymer.*⁴

¹ This results in a total of 20 pending claims, only one of which is independent; accordingly, no additional claim fees should be due at this time. Claims 1-39 were canceled in previous submissions.

² Claim 49 depends from claim 48, which was not rejected. Accordingly, for purposes of this responsive submission, Applicants presume that claim 48 also has been rejected over this combination of references.

³ Identified as "Hoxmeier" in the 5/27 Action.

⁴ The term "mer" is defined in the specification at lines 9-10 of page 3.

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Hence, ethylene and styrene are unsaturated monomers, but they do not yield unsaturated mer. Conversely, 1,3-butadiene is an unsaturated monomer that, upon incorporation into a polymer, results in unsaturated mer.

When the foregoing is understood, one sees that US'891 does not teach or suggest any living polymer that includes unsaturated mer.⁵ Any obviousness rejection based on such a misunderstanding of US'891 necessarily is legally improper.

With respect to US'624,⁶ the 5/27 Action specifically notes that "water is present in the solvent"⁷ For obvious reasons, water cannot be tolerated in any reaction involving a living polymer,⁸ such as the living polyethylene involved in the process taught in US'891. This factor alone means that US'624 cannot be combined with US'891 in the manner attempted in the 5/27 Action.

With respect to US'479,⁹ the 5/27 Action alleges that it teaches "functionalizing diene polymer with a cyclic siloxane followed by an amine with hydrogen atoms attached to the nitrogen atom" This is a mischaracterization of the teaching of US'479.¹⁰

Reproduced below are lines 13-25 of column 7 from US'479:

Another object of the present invention is a new process of preparing diene rubber compositions comprising as reinforcing filler carbon black or a mixture of carbon black and silica, characterized by incorporating by thermo-mechanical working into an elastomer comprising at least one functionalized diene polymer bearing at the chain end a silanol function or a polysiloxane block having a silanol end, or modified along the chain by silanol functions at least one organosilane compound comprising an amine or imine function in accordance with general formula I.

The incorporating of the organosilane compound of formula I is effected in any suitable device, for instance in an internal mixer or an extruder in a manner known per se. 25

The syntax of the first of these paragraphs is not a model of clarity in compositional construction,¹¹ but its practical effect is that the formula I compounds (which include

⁵ At col. 2, line 32, hydrogenated polybutadiene and polyisoprene are mentioned. However, these polymers are mentioned as examples of a "hydrocarbon polymer system with exists as a melt phase within the 30 to 80° C. temperature range ..." i.e., a solventless polymerization medium. All reference to the living polymer is to pure polyethylene only; see, e.g., lines 45-59 of col. 1 and line 58 of col. 2 through line 12 of col. 3. The styrene mentioned in the 5/27 Action is not part of the living polymer reactant but, instead, is a comonomer capable of use with the cyclic siloxane monomer reactant.

⁶ Identified as "Inoue" in the 5/27 Action.

⁷ Section 7 on page 3.

⁸ C.f. lines 27-28 of page 6 of the specification as filed.

⁹ Identified as "Labauze" in the 5/27 Action.

¹⁰ The teaching of US'479 was explained in a previous submission, but a portion of that explanation is restated here for ease of reference.

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amine or imine functionality) are "incorporat[ed] by thermo-mechanically working into an elastomer (sic)¹² comprising at least one functionalized diene polymer"

In other words, US'479 teaches that the *formula I compounds are mixed with a functionalized polymer. No reaction between the formula I amine/imine compounds and the polymer is taught*, a point which is reinforced by lines 10-30 of column 2:

- 10 The Applicant Company has surprisingly discovered that it is possible, without affecting the other properties, to greatly decrease the hysteresis of diene rubber compositions which can be used in the manufacture of tires, in particular treads, comprising as filler, carbon black or a mixture of carbon black and silica, by the use of at least one functionalized diene polymer bearing on the chain end a silanol function or a polysiloxane block having a silanol end, or modified along the chain by silanol functions with at least one organosilane compound comprising one or more amine or imine functions.
- 15 20 The invention relates to a sulfur-vulcanizable rubber composition comprising at least one functionalized or modified diene polymer and carbon black or a mixture of carbon black and silica as reinforcing filler, characterized by the fact that the diene polymer is a functionalized polymer bearing either at the chain end a silanol function or a polysiloxane block having a silanol end, or modified along the chain by silanol function, and by the fact that it comprises at least one organosilane compound having one or more amine or imine
- 25 30 functions of general formula I:

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The two denoted portions of this section show that the organosilane compound that includes amine or imine functionality is a separate component of the rubber composition and not a portion (group) of the functionalized polymer.¹³

Having shown that US'891 and US'479 do not teach that which is alleged in the 5/27 Action and that US'624 is not properly combinable with US'891, Applicants respectfully request that the obviousness rejections of claim 40 be reconsidered and withdrawn.

At present, Applicants are willing to rely on the fact that claims 41-53 depend from claim 40 which, it is believed, has been shown to be unobvious over any combination of

¹¹ US'479 appears to be an English language translation of a French priority document and, accordingly, some unusual phrasing and/or placement of clauses probably is to be expected.

¹² Either *composition* or *elastomeric composition* would make more sense and likely were intended.

¹³ The lack of reaction between the formula I compounds and the functionalized polymer also can be seen in the examples of US'479. In Example 1, a functionalized polymer (SBR-A) is synthesized; see cols. 8-9. Some of this interpolymer is thermo-mechanically mixed with aminopropyltrimethoxysilane (a formula I compound) in Example 2. No reaction between the silane and the functionalized polymer can occur based on the non-living nature of the interpolymer; c.f., page 7 of the as-filed specification.

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references cited in the 5/27 Action. Nevertheless, the right to later argue separate patentability for any of these claims is reserved.¹⁴

With respect to claim 54 and all claims dependent therefrom, in addition of US'891 failing to teach the presence of unsaturated mer in the living polymer, US'891 also fails to teach the weight limitation of the cyclic compound radical. The 5/27 Action provides a calculation based on "the concentration of siloxane monomer present [being] from 1-80 wt% (col. 3, ln. 40-45)"

The foregoing recitation fails to note that the cited portion of US'891 bases the weight percentage of the siloxane on the amount of polyethylene wax (the polymerization medium), not the living polyethylene reactant. When the calculation in the 5/27 Action multiplies the weight percentage and the stated molecular weight of the (living) polyethylene reactant (1000 to 100,000), it provides a perfect example of mixing proverbial apples and oranges.

That this calculation is incorrect is made clear by US'891 itself which explicitly states how much weight is to be attributed to the polysiloxane block: "500 to 100,000, preferably ... 1000 to 20,000."¹⁵

Accordingly, the rejection of claims 54-58 should be reconsidered and withdrawn.

Conclusion

Questions concerning this submission should be directed to the undersigned. The correspondence address of record remains unchanged.

Respectfully submitted,

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¹⁴ For example, Applicants submit that claim 49, which includes the styrene mer weight percent limitation of claim 48, has not been shown to be present in US'891 and, accordingly, obviousness rejections based on that as a primary reference are improper.

¹⁵ See the first full paragraph of col. 4.